

# Appendix

## CHECKLIST OF COST-SAVING OPPORTUNITIES

This Appendix presents an extensive, systematic listing of cost-saving opportunities, including those discussed in Chapter Two. Each line entry represents one suggestion, which is briefly described in the left-hand column. The columns indicate whether the suggestion is suitable for single-family or multifamily homes (or both), and whether it is applicable in new construction or rehabilitation (or both).

Line entries are grouped into categories according to the phase of construction or building system to which they apply, such as "Planning," "Foundations," and "Framing." Entries marked with an asterisk are some of the more widely used or recognized items and are discussed in more detail in Chapter Two.

| METHOD OR MATERIAL   | REHAB. | NEW CONSTRUCTION | SINGLE-FAMILY | MULTI-FAMILY |
|--|--------|------------------|---------------|--------------|
| <b>Construction Planning</b>   |        |                  |               |              |
| Leave unfinished areas for future expansion  |        | ■                | ■             | ■            |
| * Use prefabricated wall panels instead of site-built walls                          | ■      | ■                | ■             | ■            |
| Eliminate roof overhang and rake ends  | ■      | ■                | ■             | ■            |
| * Plan open shelves and pantries instead of kitchen cabinets                         | ■      | ■                | ■             | ■            |
| Orient building for winter solar gains where site allows                             |        | ■                | ■             | ■            |
| Eliminate front and rear parapets instead of repairing them                          | ■      |                  | ■             | ■            |
| Reduce or eliminate use of gutters and downspouts                                    | ■      | ■                | ■             | ■            |
| Use fire escape or ladders to provide second means of emergency egress               | ■      |                  |               | ■            |
| Use sprinklers to reduce fire rating of protective openings in a rated wall assembly | ■      |                  |               | ■            |
| <b>Foundations</b>   |        |                  |               |              |
| * Use monolithic slab-on-grade instead of conventional slab                          |        | ■                | ■             | ■            |
| * Use stemwall foundations instead of separate footers                               |        | ■                | ■             | ■            |
| Use insulated basement wall forms for poured walls                                   |        | ■                | ■             | ■            |
| Use permanent wood foundations in cold climates                                      |        | ■                | ■             | ■            |
| Reduce sill plate size to 2 x 4  |        | ■                | ■             | ■            |
| Use insulated concrete block systems   |        | ■                | ■             | ■            |
| * Install frost protected shallow foundations  |        | ■                | ■             | ■            |
| Reduce footing size based on soil-bearing capacity                                   |        | ■                | ■             | ■            |
| Use footer blocks instead of poured footings   |        | ■                | ■             | ■            |
| <b>Framing</b>   |        |                  |               |              |
| * Use 24-inch on center stud, joist, and truss spacing instead of 16-inch            | ■      | ■                | ■             | ■            |
| Use 7-foot 6-inch ceiling heights instead of 8-foot                                  | ■      | ■                | ■             | ■            |
| * Use corner bracing only to reduce amount of exterior sheathing                     |        | ■                | ■             | ■            |
| Use 1-inch band joist rather than 2-inch   |        | ■                | ■             | ■            |
| * Reduce sill plate size to 2 x 4  |        | ■                | ■             | ■            |
| Eliminate floor cross-bridging   |        | ■                | ■             | ■            |

| METHOD OR MATERIAL  | REHAB. | NEW<br>CONSTRUCTION | SINGLE-<br>FAMILY | MULTI-<br>FAMILY |
|---|--------|---------------------|-------------------|------------------|
| Eliminate double joints under nonbearing partitions   |        | ■                   | ■                 | ■                |
| Use single-layer T&G glue-nailed subfloor   | ■      | ■                   | ■                 | ■                |
| * Use two-stud corners instead of three-stud corners  | ■      | ■                   | ■                 | ■                |
| Eliminate mid-height fire blocking  | ■      | ■                   | ■                 | ■                |
| * Eliminate headers in openings in nonbearing walls and partitions  |        | ■                   | ■                 | ■                |
| * Use single top plates   | ■      | ■                   | ■                 | ■                |
| * Use 2 x 3 partition wall studs instead of 2 x 4s  | ■      | ■                   | ■                 | ■                |
| Use plywood box headers   | ■      | ■                   | ■                 | ■                |
| Use off-center spliced joists   |        | ■                   | ■                 | ■                |
| Eliminate band joist  |        | ■                   | ■                 | ■                |
| Use 1 x bottom plates for inline framed exterior walls  | ■      | ■                   | ■                 | ■                |
| Use 1 x top and bottom partition plates   | ■      | ■                   | ■                 | ■                |
| <b>Alternatives to Lumber and Plywood</b>   |        |                     |                   |                  |
| * Use OSB, laminated fiberboard structural sheathings, or let-in bracing in place of plywood                                  | ■      | ■                   | ■                 | ■                |
| Use wood I-beams at 24-inch o.c. for floor joists   |        | ■                   | ■                 | ■                |
| * Steel partition framing   | ■      | ■                   | ■                 | ■                |
| * Steel load-bearing framing  | ■      | ■                   | ■                 | ■                |
| Foam core panels  |        | ■                   | ■                 | ■                |
| Insulated concrete wall forms   |        | ■                   | ■                 | ■                |
| Welded wire sandwich panels   |        | ■                   | ■                 | ■                |
| Insulated concrete block systems  |        | ■                   | ■                 | ■                |
| * Plastic or wood-plastic lumber for nonstructural use  | ■      | ■                   | ■                 | ■                |
| Use flat floor trusses  |        | ■                   | ■                 | ■                |
| * Replace sheathing and corner bracing with single layer plywood siding   | ■      | ■                   | ■                 | ■                |
| <b>Electrical</b>   |        |                     |                   |                  |
| * Use plastic electric receptacle boxes   | ■      | ■                   | ■                 | ■                |
| * Use surface mount electrical conduit or behind baseboard raceway  | ■      | ■                   | ■                 | ■                |
| * Allow smaller number of electrical outlets for existing buildings than for new buildings (minimum 2 per room; 3 in kitchen) | ■      |                     | ■                 | ■                |
| <b>Plumbing</b>   |        |                     |                   |                  |
| * Use mechanical plumbing vents instead of through-the-roof vents   | ■      | ■                   | ■                 | ■                |
| * Use direct venting of drain-waste-vent (DWV) plumbing   | ■      | ■                   | ■                 | ■                |
| * Use plastic DWV and water pipe  | ■      | ■                   | ■                 | ■                |
| * Use stack-venting or wet-venting of DWV pipe  | ■      | ■                   | ■                 | ■                |
| <b>Finish/Trim</b>  |        |                     |                   |                  |
| * Eliminate window trim by returning and finishing drywall  | ■      | ■                   | ■                 | ■                |
| * Gypsum laminate (cover) over badly cracked plaster instead of replacing or repairing  | ■      |                     | ■                 | ■                |
| * Eliminate partitions  |        |                     | ■                 | ■                |
| * Open shelves instead of cabinets in kitchens and bathrooms  | ■      | ■                   | ■                 | ■                |
| <b>Water Service</b>  |        |                     |                   |                  |
| * Use common lateral water pipes  | ■      | ■                   | ■                 | ■                |
| * Use a common trench for utilities   | ■      | ■                   | ■                 | ■                |
| Reduce pipe size  |        | ■                   | ■                 | ■                |
| <b>Sewage Disposal</b>  |        |                     |                   |                  |
| Use plastic sewer pipe rather than concrete or metal pipe   | ■      | ■                   | ■                 | ■                |
| * Use common lateral sewer pipes  | ■      | ■                   | ■                 | ■                |
| * Use sand mound septic systems   | ■      | ■                   | ■                 |                  |

| METHOD OR MATERIAL   | REHAB. | NEW CONSTRUCTION | SINGLE-FAMILY | MULTI-FAMILY |
|--|--------|------------------|---------------|--------------|
| Use evaporation and absorption beds  | ■      | ■                | ■             |              |
| Use small diameter gravity sewers with individual septic tanks                     | ■      | ■                | ■             | ■            |
| Use septic tank effluent pump system (pressure system)                             | ■      | ■                | ■             | ■            |
| Use vacuum sewers  | ■      | ■                | ■             | ■            |
| * Use recirculating sand filter septic system                                      | ■      | ■                | ■             |              |
| <b>Land Planning and Density</b>   |        |                  |               |              |
| * Cluster homes in higher density without changing overall density                 |        | ■                | ■             | ■            |
| * Reduce house setbacks, frontage, floor/area ratio                                |        | ■                | ■             | ■            |
| * Reduce lot size  |        | ■                | ■             | ■            |
| * Include variety of housing types   |        | ■                | ■             | ■            |
| * Take advantage of nontraditional zoning to increase density                      |        | ■                | ■             | ■            |
| <b>Land Development</b>  |        |                  |               |              |
| * Reduce (one side only) or eliminate sidewalks                                    |        | ■                | ■             | ■            |
| * Reduce width of sidewalks to 3-foot maximum                                      |        | ■                | ■             | ■            |
| * Limit right-of-way widths to minimum needed for street and maintenance           |        | ■                | ■             | ■            |
| * Place sidewalks and utilities in easements rather than in right-of-way           |        | ■                | ■             | ■            |
| * Reduce radius of bulb cul-de-sacs; use T-, hammerhead-, or island-turnarounds    |        | ■                | ■             | ■            |
| Reduce size of curb and gutter   |        | ■                | ■             | ■            |
| * Use swales rather than curbs and gutters   |        | ■                | ■             | ■            |
| * Reduce street widths according to function                                       |        | ■                | ■             | ■            |
| * Use asphalt or crushed rock for driveways rather than concrete                   | ■      | ■                | ■             | ■            |
| * Use common driveways or parking areas  | ■      | ■                | ■             | ■            |
| Use rolled or mountable curbs instead of vertical curbs                            |        | ■                | ■             | ■            |
| Use integral curbs (combined sidewalks and curbs)                                  |        | ■                | ■             | ■            |
| Use an alley to provide parking or driveway on narrow lots                         |        | ■                | ■             | ■            |
| Use gravel or asphalt walkways instead of concrete                                 | ■      | ■                | ■             | ■            |
| * Use ribbon strips (wheel paths) instead of solid full-width driveways            | ■      | ■                | ■             | ■            |
| Reduce thickness of concrete walks to 2 1/2 inches                                 | ■      | ■                | ■             | ■            |
| * Use paths instead of street sidewalks  |        | ■                | ■             | ■            |
| <b>Energy</b>  |        |                  |               |              |
| * Use blown-in insulation instead of batts for ceilings                            |        | ■                | ■             | ■            |
| * Reduce window areas where possible   | ■      | ■                | ■             | ■            |
| * Use vinyl windows instead of wood windows  |        | ■                | ■             | ■            |
| * Use foam wall sheathing instead of structural sheathing                          |        | ■                | ■             | ■            |
| * Use flame-resistant batt or blanket insulation on basement walls                 |        | ■                | ■             | ■            |
| * Use "component performance" rather than "acceptable practice" to comply with MEC | ■      | ■                | ■             | ■            |

# References

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## ANNOTATED BIBLIOGRAPHY

The following publications are available from HUD USER, the clearinghouse for U.S. Department of Housing and Urban Development (HUD) publications. Most are available for a \$4.00 handling charge (no cost to U.S. Department of Housing and Urban Development offices). Charges for out-of-print publications and unpublished reports may be more. For a complete publications list or to order publications listed below, contact:

**HUD USER**  
P.O. Box 6091  
Rockville, MD 20850  
1-800-245-2691 or 301-251-5154

### *Affordable Housing Challenge and Response:*

*Volume 1: Affordable Residential Land Development*, HUD #5039 \$4.00

*Volume 2: Affordable Residential Construction*, HUD #5051 \$4.00

Presents findings of HUD-sponsored Joint Venture for Affordable Housing (JVAH), a program designed to demonstrate cost-saving techniques in actual subdivisions nationwide. The publication includes all phases of housing production: land planning, site layout, land development, on-site infrastructure installation, and house construction. Illustrations and documented cost-savings accompany the text.

*Affordable Housing: Development Guidelines for State and Local Government*, HUD #5940 \$4.00

Presents technical guidance and information to State and local governments to reform their regulatory systems to encourage provision of affordable housing. Focuses on land development techniques, construction practices and building codes, zoning provisions, and subdivision requirements and offers suggested ordinances and code

language.

*Alternatives to Lumber and Plywood in Home Construction*, HUD #6135 \$4.00

Identifies several alternative materials or building systems that can be used in residential construction under most current building codes, as well as emerging technologies that will be commercially available in the near future.

*Applying Cost Effective Energy Conservation Standards (CEECS) in Rehabilitation Projects*, HUD #2778 \$10.00 (reproduction copy)

Energy conservation measures that may/must be undertaken during residential rehabilitation. Describes standards and discusses their use in single- and multifamily buildings.

*Energy Conservation for Housing* HUD #2651 \$25.00

A workbook designed to assess existing energy consumption and energy conservation potential in public housing. Applicable to all multifamily housing. Useful for energy audits.

*Energy Conservation and Housing Rehabilitation Under the HOME Program*, The American Communities Information Center, P.O. Box 7189, Gaithersburg MD 20898-7189, 1-800-998-9999.

*Frost-Protected Shallow Foundations in Residential Construction—Phase I*, HUD #6143 (unpublished report.) \$15.00

Presents an investigation and demonstration of frost-protected shallow foundations in homes, including cost-effectiveness of the technology and design and construction guidance for builders, designers, and code officials.

***Home Building Cost Cuts: Construction Methods and Materials for Affordable Housing*, HUD #2930 \$4.00**

Loose-leaf bulletins documenting cost-effective techniques in residential design, materials research and usage, and construction methods.

***Housing Quality Standards (HQS) (two video tapes)*, HUD #5353 \$60.00**

Provides training for public housing agency staff, housing managers, and inspectors in Housing Quality Standards (HQS) of the Section 8 Existing Housing Program to provide affordable housing for low-income families. (All units, new or rehabilitated, must meet the HQS before occupancy.)

***Innovative Site Utilities*, HUD #3159 (reproduction copy) \$10.00**

Identifies and describes both practical and innovative cost-saving methods and materials that are being used across the country to reduce site utility costs for residential development.

***Making Rental Housing Energy Efficient: Guide to Performing Energy Retrofit During Multifamily Property Rehabilitation*, HUD #5650 \$4.00**

***Model Energy Code Compliance Procedures (MECCP) Version 1.0*, HUD #5904 \$20.00**

Computer software package and accompanying user guide automates procedures for determining if a building design meets the provisions of the model energy code (MEC).

***Proposed Model Land Development Standards and Accompanying Model State Enabling Legislation*, HUD #6212 \$4.00**

Presents detailed minimum standards and specifications that can be incorporated into local development ordinances. Includes streets, stormwater management, sediment and erosion control, site utilities, sanitary sewage, water supply standards, and model enabling legislation. Illustrated.

***Recirculating Sand Filter Septic Systems, Report to HUD* available Fall 1994.**

Presents design, performance, and results of three sand filter demonstration sites.

***Rehabilitation Guidelines***

An 11-volume set addressing upgrade and conservation of nation's building stock. The following volumes include cost-saving techniques that can be applied during rehabilitation.

***Volume 6: Electrical Guidelines for Residential Rehabilitation*, HUD #50788 \$4.00**

***Volume 7: Plumbing DWV Guideline for Residential Rehabilitation*, HUD #50789 \$4.00**

***Volume 9: Guideline for Structural Assessment*, HUD #2958 \$4.00**

***Volume 10: Guideline for Rehabilitation of Walls, Windows, and Roofs*, HUD #2959 \$4.00**

***Stemwall Foundations for Residential Construction*, HUD #6134 (unpublished report) \$10.00**

Addresses design and demonstration of monolithic stemwall foundations for basement, split-level, and crawlspace homes.

The following publications provide additional information on cost-saving technologies for affordable housing that have been discussed in this HOME model program. They are readily available from the noted sources.

***Affordable Single-Family Housing—A Review of Development Standards*, American Planning Association (APA), 1984, #PAS 385, \$30.00**

Discusses land-use strategies for affordable housing and their effectiveness in 13 communities. Includes parking, outdoor space, and privacy issues. Available from:

American Planning Association  
Planners Bookstore  
1313 E. 60th Street  
Chicago, IL 60637-2891  
312-955-9100

***Automated Builder Dictionary/Encyclopedia of Industrialized Housing*, Don O. Olson, editor, 1991, \$15.00**

Provides a comprehensive introduction to industrialized housing (panelized, modular, and HUD-Code units). Includes definitions, materials, tools, engineering principles, unit designs and components, and production processes. Available from:

Automated Builder Magazine  
Publications Division  
P.O. Box 120  
Carpinteris, CA 93014  
805-684-7659

**Model Energy Code: Thermal Envelope Compliance Guide for One and Two Family Dwellings, North American Insulation Manufacturers' Association, November 1993, #B1407, \$10.00**  
Presents easy-to-use energy application and trade-off worksheets, with expected performance of numerous component constructions to enable users to determine MEC compliance. Includes discussions of energy use, materials selection, and building design. Available from:

North American Insulation Manufacturers Association  
44 Canal Center Plaza Suite 310  
Alexandria, VA 22314  
703-684-0084

**The Cost Cuts Manual: Nailing Down Savings for Least-Cost Housing—164 Ideas for Saving Money in Rehabilitation, Enterprise Foundation Rehab Work Group, 1987, \$25.00**  
Presents resourceful, effective approaches to low-cost rehabilitation that can be used by public and private sectors. Includes acquiring property cheaply, designing-out unneeded rehab, construction methods and materials, efficient management, and labor-saving methods. The Enterprise Foundation also produces loose-leaf style *Cost Cuts* tips several times annually to provide additional information on reducing construction costs in low-income housing and rehabilitation. Available from:

The Enterprise Foundation Rehab Work Group  
500 American City Building  
Columbia, MD 21044  
301-964-1230

**Cost-Effective Home Building: A Design and Construction Handbook, NAHB Research Center, 1994, \$10.00**  
Presents Optimum Value Engineering (OVE) approach to design and construction. Includes revised strength and span lumber tables, metric conversions, and new technologies. Available from:

NAHB Research Center  
400 Prince Georges Blvd.  
Upper Marlboro, MD 20772  
301-249-4000

**Cost-Effective Site Planning, National Association of Home Builders (NAHB), 1986, #ISBN 0-86718-270-9, \$23.50**  
Discusses making higher density housing fit any community. Includes sample site plans and solutions for problems caused by increased density. Available from:

Home Builders Bookstore  
National Association of Home Builders  
1201 15th Street NW  
Washington, DC 20005  
1-800-223-2665 or 202-822-0463

**Design Manual, On-site Wastewater Treatment and Disposal Systems, U.S. Environmental Protection Agency (EPA), 1980**  
Provides technical information on on-site wastewater treatment and disposal systems. It does not include standards, rules, or regulations regarding the systems. Available from:

National Small Flows Clearinghouse  
(pub. #WWBKDM35 \$31.30)  
West Virginia University  
P.O. Box 6064  
Morgantown, WV 26506-6064  
1-800-624-8301

National Technical Information Service  
(#PB83219907 \$52.00)  
U.S. Department of Commerce  
5285 Port Royal Road  
Springfield, VA 22161

**Energy Conservation Technical Information Guide, vol. 3: Residential Buildings, Department of Energy, 1989.**  
Focuses on structural elements and mechanical elements that conserve energy. Topics range from energy-efficient walls, and windows to high performance heating systems and energy-conserving appliances. Available from:

National Technical Information Service  
(#DE89009468 \$27.00)  
U.S. Department of Commerce  
5285 Port Royal Road  
Springfield, VA 22161



***Land-Use Regulations Handbook, National Institute of Building Sciences, 1990, #5063-4, \$10.00***

Presents land-use guidelines for affordable housing including strategies for zoning, density, and land development. Includes appendix of basic terminology and processes used in land development regulation. Available from:

National Institute of Building Sciences (NIBS)  
1201 L Street NW  
Washington, DC 20005

***PUDs in Practice, Urban Land Institute (ULI), 1985, #P36, \$36.00***

Discusses design and regulatory elements of planned unit developments (PUDs), including PUD ordinance language, development process, and review and approval process. Illustrated by five case studies. Available from:

Urban Land Institute—Publication Orders  
625 Indiana Avenue, NW  
Washington, DC 20004-2930  
1-800-321-5011 or 202-624-7142

***Residential Streets, 2nd edition, American Society of Civil Engineers (ASCE), Urban Land Institute (ULI), and National Association of Home Builders (NAHB), 1990***

Differentiates street types by function and recommends design and construction guidelines. Available from:

Urban Land Institute #R07 \$23.00  
625 Indiana Avenue, NW  
Washington, DC 20004-2930

or

National Association of Home Builders #ISBN  
O-86718-341-1 \$23.00.  
1201 15th Street NW  
Washington, DC 20005

***Small Wastewater Systems—Alternative Systems for Small Communities and Rural Areas, EPA. (pamphlet) Available from:***

Small Flows Clearinghouse (#WWBLPE02 Free)

or

National Center for Environmental Publications and Information (NCEPI) Free  
11029 Kenwood Road  
Cincinnati, OH 45242  
513-891-6561

***Truss-Framed Construction, NAHB Research Center and U.S. Forest Products Laboratory, 1982, \$5.00.***

Covers essentials of technique that integrates roof trusses, floor trusses, and wall studs into unified frames. Includes design, fabrication, and erection. Available from NAHB Research Center.

Publications and other documents produced by various U.S. government departments/agencies can be located through the following sources:

**National Center for Environmental Publications and Information (NCEPI)**

Dissemination center for all EPA publications. Call 513-569-6685.

**National Technical Information Service (NTIS)**

Dissemination of government technical publications. Provides subject bibliography and price list, fills publications orders:

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703-487-4650

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U.S. Government Printing Office  
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202-783-3238

## MODEL BUILDING CODES

### Council of American Building Officials (CABO)

CABO is the umbrella organization for the three major nationally recognized model code organizations and consolidates their efforts on matters of mutual concern:

- **The Building Officials & Code Administrators International (BOCA)** publishes the *BOCA Basic/National Code*, generally used in the Northeast and Midwest.
- **The International Conference of Building Officials (ICBO)** publishes the *Uniform Code*, generally used in the South.
- **The Southern Building Code Congress International (SBCCI)** publishes the *Standard Code*, used mostly west of the Mississippi.

The **CABO One- and Two-Family Dwelling Code** is a major CABO activity. All three model code organizations recognize this code, accepted as a suitable replacement for the HUD Minimum Property Standards for One- and Two-Family Dwellings (MPS).

The **Model Energy Code (MEC)** is another CABO document published jointly by the three model code organizations.

### National Fire Protection Association (NFPA)

NFPA publishes the *National Electrical Code (NEC)*.

Code organizations can be contacted as follows:

#### Building Officials and Code Administrators

4051 West Flossmoor Road  
Country Club Hills, IL 60477  
1-800-323-1103 or 312-799-2300

#### Council of American Building Officials

5203 Leesburg Pike, Suite 708  
Falls Church, VA 22041  
703-931-4533

#### International Conference of Building Officials

5360 South Workman Mill Road  
Whittier, CA 90691  
1-800-423-6587 or 213-699-0541

#### National Fire Protection Association

Batterymarch Park  
Quincy, MA 02269-9990  
1-800-344-3555 or 617-770-3500

#### Southern Building Code Congress International, Inc.

900 Montclair Road  
Birmingham, AL 35213-1206  
1-800-633-3876 or 205-591-1853



## HELPFUL ORGANIZATIONS

The following organizations may be able to assist in locating materials on a specific subject. Most have publication lists available on request.

**American Forest and Paper Association**

1111 19th Street NW, 8th Floor  
Washington, DC 20036  
202-463-2700

**American Institute of Architects**

1735 New York Avenue NW  
Washington, DC 20036  
202-626-7300

**American Iron and Steel Institute**

1133 15th Street NW  
Washington, DC 20005  
202-452-7100

**American Planning Association**

1313 E. 60th Street  
Chicago, IL 60637-2891  
312-955-9100

**Building Systems Council**

1201 15th Street NW  
Washington, DC 20005  
202-822-0576

**Enterprise Foundation/Rehab Work Group**

500 American City Building  
Columbia, MD 21044  
410-964-1230  
Attn: Communications/Public Affairs Office

**National Association of Home Builders**

1201 15th Street NW  
Washington, DC 20005  
202-822-0200

**NAHB Research Center**

400 Prince Georges Blvd  
Upper Marlboro, MD 20772  
301-249-4000

**National Small Flows Clearinghouse**

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P.O. Box 6064  
Morgantown, WV 26506-6064  
1-800-624-8301

**North American Insulation Manufacturers Association**

44 Canal Center Plaza Suite 310  
Alexandria, VA 22314  
703-684-0084

**Urban Land Institute**

625 Indiana Avenue NW  
Washington, DC 20004-2930  
1-800-321-5011 or 202-624-7000